



INAF

Instituto
de Investigaciones
Agro-Forestales



Population structure of *Magnolia cubensis* subsp. *cubensis* in the Ecological Reserve “El Gigante”

Autores: MSc. Yenia Molina Pelegrín, Lic. William Santos Chacón, MSc. Adonis Sosa López, MSc. Magalys Arcia Chávez, Dr. C Orlidia Hechavarría Kindelán, Téc. Marcial Rosales Rodríguez

INTRODUCTION



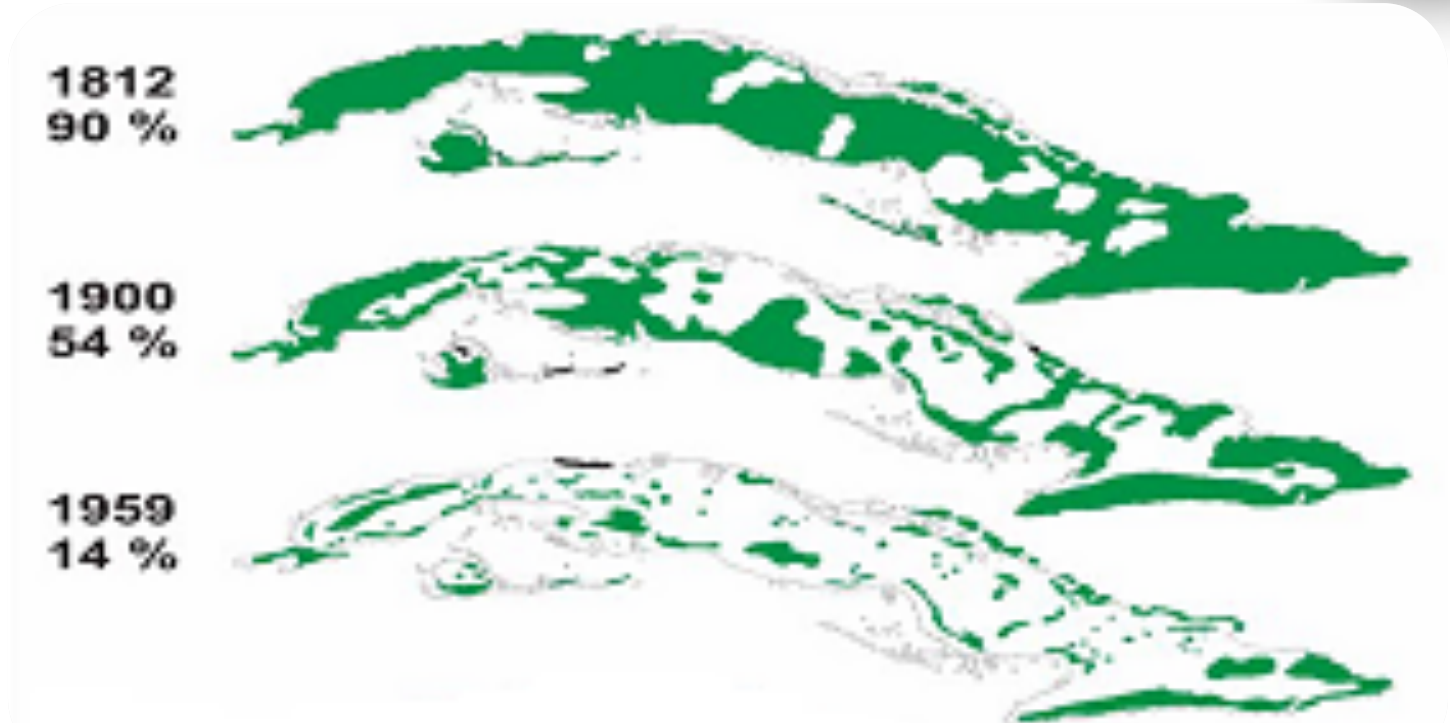
The deterioration of tropical forests is happening at an increasing rate. This situation has led to the extinction of many tropical species (Hechavarría, 2009).



INTRODUCTION



Cuba

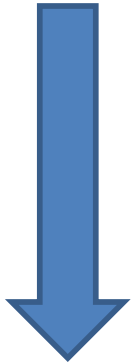


Cuba, as other tropical countries, shows the decrease of woodland due to anthropic action. Precisely, according to Borhidi & Herrera (1997) before Cuba's discovery almost all the island was covered by forest. In 1959 Cuban forest areas only represented the 14 % of the national land. This brought about a substantial threat for the flora, with a 14 % of species extinct or in process of extinction (Cuevas & García, 1982). An irrational management of the mountain range "Sierra Maestra" in the last two centuries has provoked soil degradation and species loss. Currently, we can observe many areas bereft of trees due to agriculture, felling and inadequate soil use (Santos *et al.* 2010).

INTRODUCTION



Cuba



Reserva Ecológica El Gigante

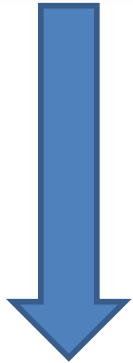


The Ecological Reserve “El Gigante” is located in “Sierra Maestra” mountain range. It supports an outstanding diversity of species, many of which are endangered as a consequence of deforestation and illegal timber extraction.

INTRODUCTION



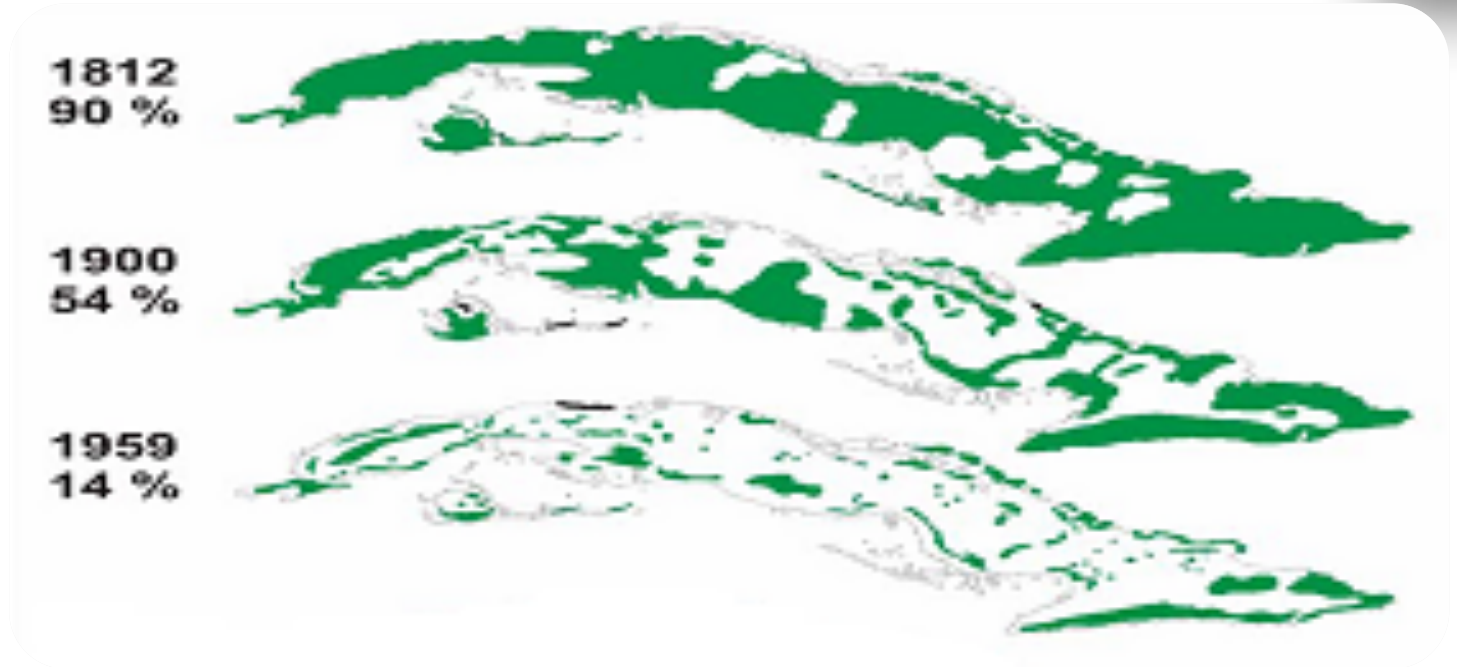
Cuba



Reserva Ecológica El Gigante



Magnolia cubensis Urb. subsp. *cubensis*



One of this species is *Magnolia cubensis* subsp. *cubensis*, a valuable species endemic to the eastern region of Cuban. Some action has been taken for the conservation of this species, although according to Gonzalez-Torres *et al.* (2016) it is still considered as Vulnerable.

INTRODUCTION

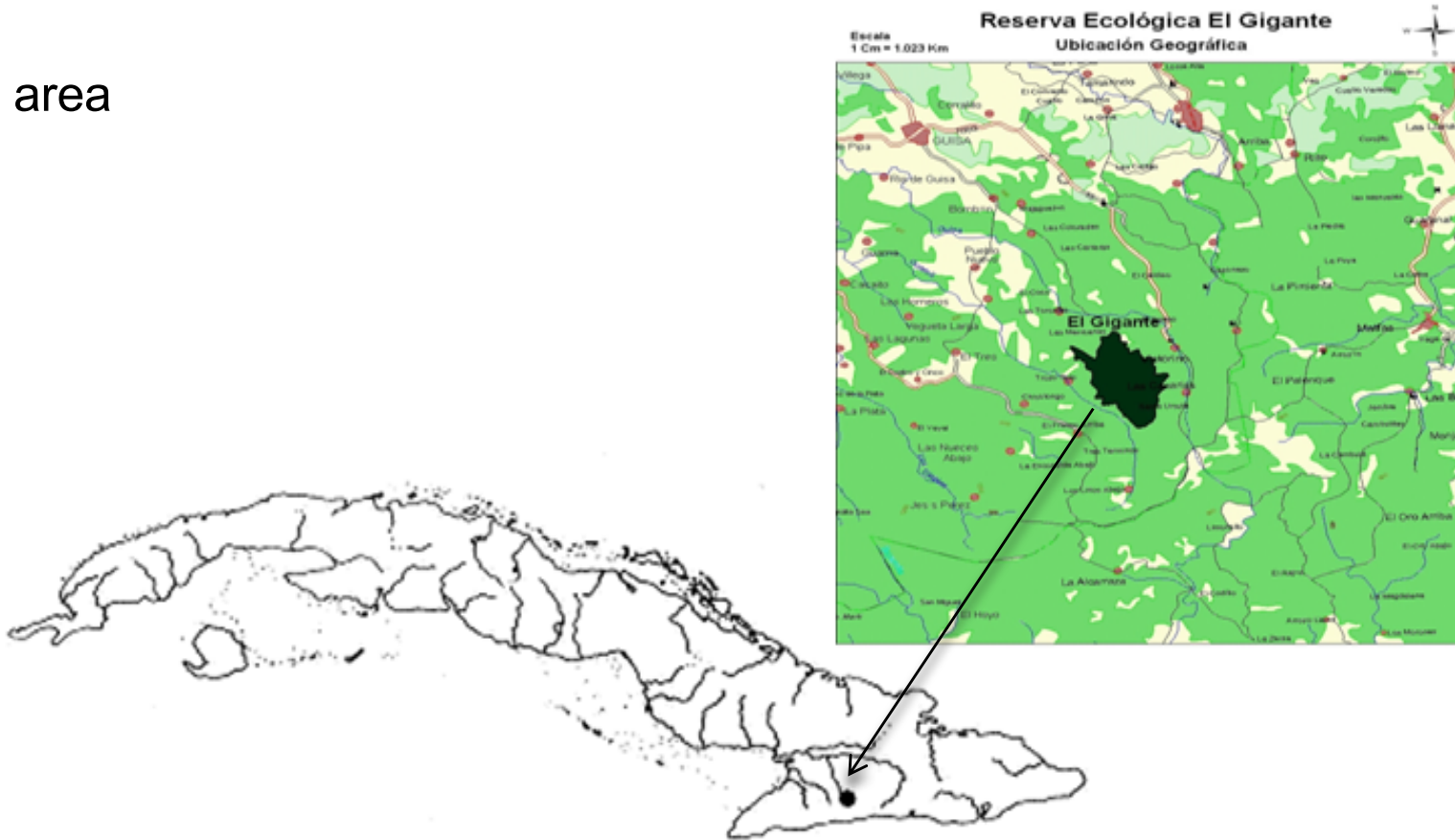
The main goal of this project is to assess the structure of the population of *Magnolia cubensis* Urb. subsp. *cubensis* in the Ecological Reserve “El Gigante”, in the mountain range of “Sierra Maestra”.



MATERIALS AND METHODS



Study area



The study was made at the Ecological Reserve “El Gigante”, a protected area in the province Granma, Cuba. This area is located in the “Sierra Maestra” mountain range and it has an area of 15 km². The higher summit is 1 332 meter.

MATERIALS AND METHODS



We made a population census, and for each individual we recorded the height and diameter, the reproductive status, the phytosanitary status and evidences of mechanical damage if any. The plant height was measured using the Blume-Leiss hypsometer. The classes of age was determined taking into account the height and the diameter as we show in Table 1.

Table 1. Height class and diameter class for *Magnolia cubensis* subsp. *cubensis*.

Heightclass	Height (m)	Diameterclass	Diameter(cm)
1	1.1 – 4	1	4.0 – 16.0
2	4.1 – 7	2	16.1 – 28.0
3	7.1 – 10	3	28.1 – 40.0
4	10.1 – 13	4	40.1 – 52.0
5	13.1 – 16	5	52.1 – 64.0
6	16.1 – 19	6	64.1 – 76.0
7	19.1 – 22	7	76.1 – 88.0
8	22.1 – 25	8	88.1 – 100.0
		9	100.1 – 112.0

MATERIALS AND METHODS



Population status: The population data was analyzed using descriptive statistics taking into account the number of individuals by class to produce the frequency histograms.

The reproduction status and the presence of natural regeneration was recorded according to direct observations.

Mechanical damage: We considered as a mechanical damage the eventual cuts in branches and trunk, and the fell individuals.

MATERIALS AND METHODS



Population Phytosanitary status

The phytosanitary status was evaluated according to López *et al.* (2003), who analyzed the presence of harmful agents that could affect the species. The status of the groups was ranked by three categories, “good”, “regular” and “bad”. Were ranked good: the groups without harmful agents or with a little presence of them. Regular: when we observed light affectations; and Bad: when a major part of the population was severally affected by harmful agents.

Flora and vegetation

We listed the taxonomic groups (taxa) cohabiting with *Magnolia cubensis*. They were identified either at the site or collected and identified through herbarium and literature.

RESULTS Y DISCUSSION



The prospection work allowed us to find and mark 62 individuals of *Magnolia cubensis* subsp. *cubensis*, belonging to different age classes. The individuals were recorded from 1200 to 1242 m. Bisse (1998) and Imchanitskaya (1991), reported the presence of this species at an altitude over 700 m.

No. Total de individuos	Altura msnm	Pendiente (°)	Exposición
5	1242	60	NE
7	1237	65	W
6	1231	65	W
18	1225	70	NE
18	1218	75	E
5	1200	70	SE
3	1215	40	NW

RESULTS Y DISCUSSION



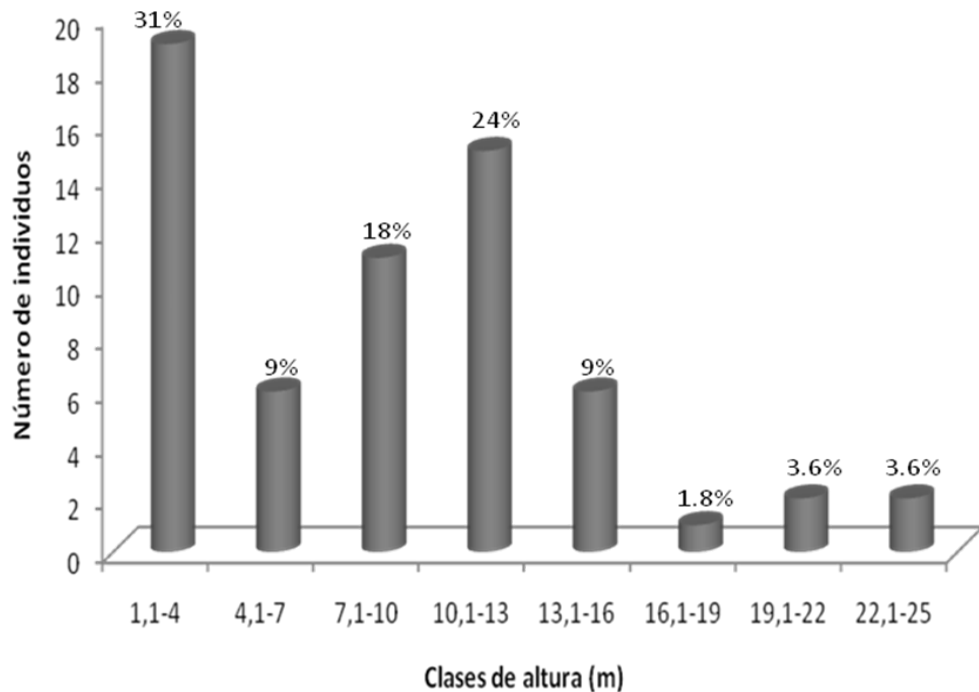
Magnolia cubensis lives in isolated or in little groups, which causes a bigger vulnerability to natural events and to anthropic actions.

Fires, meteorological events, plague attacks and human actions are several causes that provoke the habitat destruction of *Magnolia cubensis* subsp. *cubensis*.

RESULTS Y DISCUSSION



Vertical structure



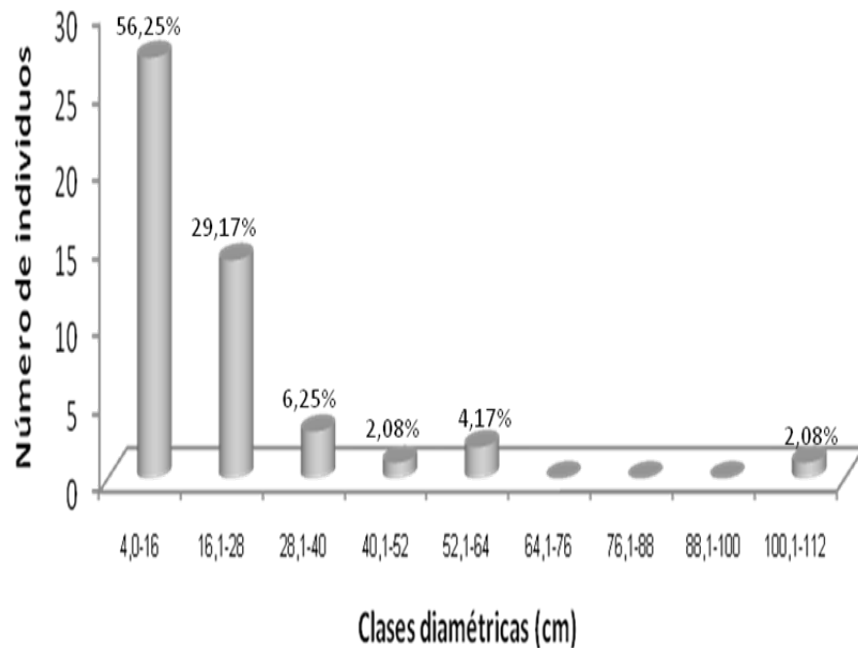
Vertical structure of *Magnolia cubensis* in the Ecological Reserve "El Gigante".

In the study area, *Magnolia cubensis* presented a 91 % of individuals in the class between 1.1 and 13 m; while 31 % of these individuals measured between 1.1 and 4 m. 9 % of the total had a height superior to 16 m. This data shows a young population, with an aggrupation of individuals in the first and in the intermediate class. According to Roig (1975) the species can grow reach 15 meter height. No individuals smaller than 1 m were found, but we found few individuals smaller than 4 m. These results match with a low regeneration and survival, characteristic of certain magnolias.

RESULTS Y DISCUSSION



Horizontal structure



The population of *Magnolia cubensis* is structured in nine diametric classes, with 56.25 % of them in the class between 4 and 16 cm. The first two classes represent the 91.67 % of the population, and after the third class the population has a decrease in number of individuals. The distribution of individuals shows a pattern of inverted J, with the majority of individuals in the first class. This indicates a young population with probable exploitation of the old individuals, which were the less common in the census.

Horizontal structure of *Magnolia cubensis* in the Ecological Reserve “El Gigante”.

RESULTS Y DISCUSSION



The absence of saplings under 1250 m height, indicates a population who needs shadow and other environmental conditions (temperature, moisture and soil type) for their reproduction. These assumptions refer to May (2001) for *Magnolia pallescens* in the cloud forest of Dominican Republic with a height under 1400 m.

According to Oostermeijer et al. (1994) a low frequency of saplings is an indicator of renewal problems. This situation happened to *M. cubensis* in the study area, where the natural regeneration was scant. However, Santos et al. (2010) reported a high number of *Magnolia cubensis* saplings in the National Park “La Bayamesa”, and a good natural regeneration with a great number of younger individuals.

RESULTS Y DISCUSSION



In fact 40.32 % of the individuals were in a reproductive state, which means a great number of individual that can generate seeds.

RESULTS Y DISCUSSION



Phytosanitary status



The phytosanitary status was ranked regular, since we observed individuals with damage. We observed the effects of herbivores and parasites on the fruits. That could explain the absence of young individuals. Also Álvarez *et al.*, (2006) and Castillo (1997), reported the presence of insect's larva in the fruits of *Magnolia cubensis* subsp. *acunae* in Topes de Collantes, with significant damage.

RESULTS Y DISCUSSION



Phytosanitary status

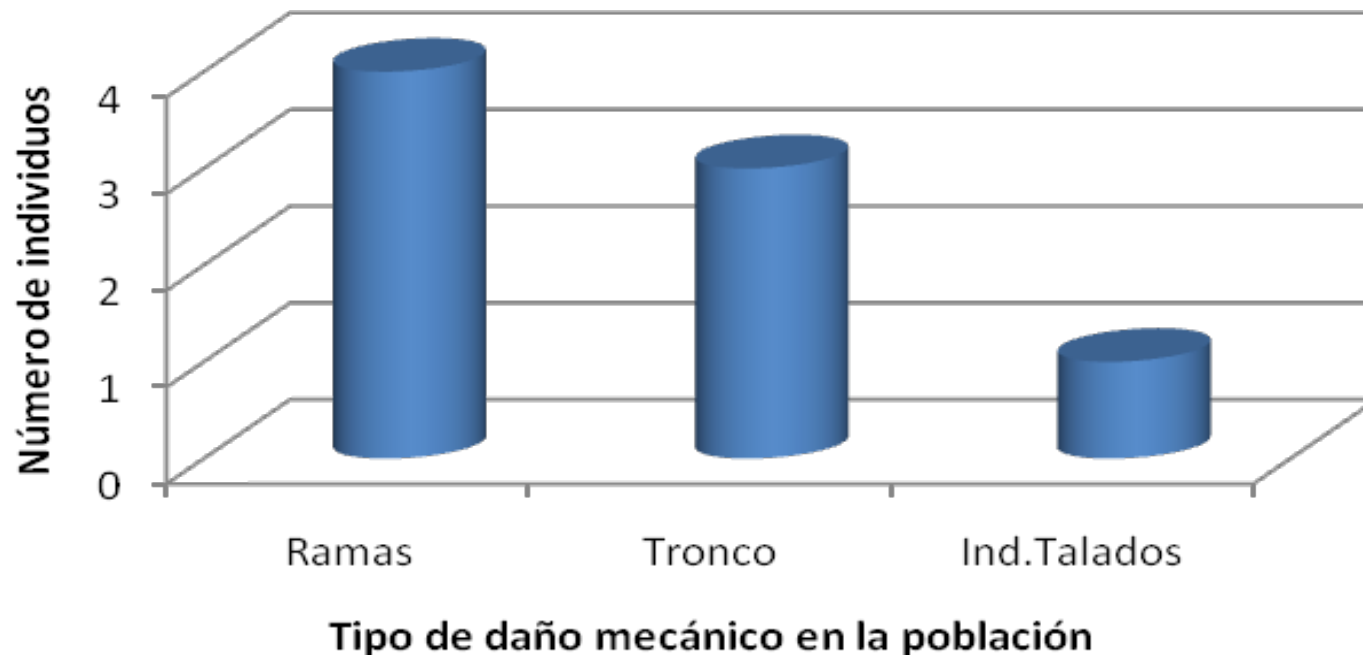


The phytosanitary status was ranked regular, since we observed individuals with damage. We observed the effects of herbivores and parasites on the fruits. That could explain the absence of young individuals. Also Álvarez *et al.*, (2006) and Castillo (1997), reported the presence of insect's larva in the fruits of *Magnolia cubensis* subsp. *acunae* in Topes de Collantes, with significant damage.

RESULTS Y DISCUSSION



Mechanical damage



We observe the presence of mechanical damage in some individuals of *Magnolia cubensis*. We also observed forestry management under the magnolia trees which affects natural regeneration.

RESULTS Y DISCUSSION



Flora and vegetation

The flora and vegetation associated with *Magnolia cubensis* are composed by 42 taxa, belonging to 22 plants family and 27 genera. The most common family are Bromeliaceae, Orchidaceae, Aspleniaceae and Bignoniaceae.



Pachyanthus pedicellatus



Sideroxylon jubilla

CONCLUSIONS



The population structure of *Magnolia cubensis* in the Ecological Reserve “El Gigante” is characterized by an aggrupation of individuals in the intermediate class for the height variable and in the first class for the diameter. The species shows an unstable age structure, due to the absence of individuals of less than 1 meter and an insufficient renewal.

Due to the importance of this species and the results obtained, the species has to be analyzed for its inclusion in the CITMA Resolution 160/2011.



Our Sponsors





MUCHAS GRACIAS